Basis of Research and Technology (R&T) Estimate
for GFCE for the River Protection Privatization Phase I, Part B

The GFCE R&T estimate was based on the guidelines in EGG-WTD-10443, *Waste Management Facilities Cost Information Report*. In this report, planning studies, bench-scale tests, and demonstration costs for a large-scale, LAW vitrification plant are estimated to cost ($6,188K+$7,016K) ~ $14 million in 1992 dollars. Adjusting to 2000 dollars at 3 percent inflation, the cost would be approximately $17 million. Similar amounts are assumed for HLW Melter and Pretreatment R&T for a total of $52.1 million. This amount was treated as labor and subcontractor costs and divided between the WBS elements as described in Table 1 below.

Table 1 GFCE R&T Cost Estimate

WBS Element	Description	Labor Hours	Labor Cost	Subcontract Cost
0.1.02.70.001	IJV R&T Management	24,000	$2,400,000	
0.1.02.70.002	IJV R&T Modeling	44,000	$4,400,000	$20,000,000
0.1.02.70.003	IJV R&T Project Controls	16,000	$1,600,000	
0.1.02.70.004	IJV R&T Waste Classification & Qualification	22,000	$2,200,000	$20,000,000
0.1.02.70.005	IJV R&T support to Commissioning	15,000	$1,500,000	
	Total	121,000	$12,100,000	$40,000,000

Attachment 1 and Attachment 2 contain the relevant information from the EGG-WTD-10443, *Waste Management Facilities Cost Information Report.*

A.4.1 Planning. Studies and Tests

Estimated planning costs for the planning studies and bench-scale tests for each facility consists of three subcomponents: manpower, equipment testing, and equipment installation. Manpower is defined as the effort needed for initial paper studies, bench scale tests, and secondary paper studies. Study durations and manpower estimates for these efforts were obtained from tables contained in an existing report (F. Feizollahi, et. al., Preliminary Stored Waste Systems Design Study for Low-Level TRU Waste Treatment Report, EGG-WTD-10254, 1992). Equipment budgetary costs and associated installation costs for lab equipment, such as mixers and prototype ovens used in tests, were obtained from the same reference.

The planning studies and tests cost component was estimated assuming a cost of $150,000 per full-time equivalent (FTE) for scientists and engineering manpower.

Table A-2 containing a development, testing, and evaluation cost estimating spreadsheet for a medium-sized incineration facility is included as an example.

A.4.2 Demonstration

The demonstration cost component consists of nine subcomponents. Cost estimates for three of the subcomponents (manpower during demonstration, building structure, and equipment) were obtained from an existing report (Feizollahi, 1992). The remaining six subcomponents (design, inspection, project administration, indirect, construction management, and contingency) were determined by using percentage factors provided by EG&G Idaho. These factors are the same as those used for the production facility (see Section A4.3 below), and are as follows:

Design, inspection, project administration, indirect, construction management, and contingency costs subcomponents are developed using percentage guidelines. This approach facilitates development of PLCC estimates suitable for relative comparison of various options. The percentages are historical averages experienced by DOE contractors at the INEL for the types of activities covered by waste management facilities. In addition,

Contingency on all costs is 25%.

- Design cost, applied to construction cost1otal, is 30% during the demonstration phase. During the production phase, it is 18% for LLW/LLMW and 25% for alpha-LLW/LLMW facilities. Design costs for the storage and disposal facilities are 18% of the cost for 1 year's capacity of storage -or disposal structures.

  - Inspection cost, applied to construction cost total, is 7%.

  - Project management cost, applied to construction cost total, is 10%.

  - Indirect cost, applied to total building plus equipment and installation costs, is 29%.

Table 9-3. PLCC estimate summary for LLW/LLMW vitrification facility (cost module HL).

Cost component	Cost Items		Cost ($ x 1000) Small	Medium	Large
1.0	**Studies and bench scale test costs**				
	1.1 Manpower costs during research		$3,600	$3,600	$3,600
	1.2 Equipment costs		$250	$250	$250
	1.3 Installation costs		$650	$650	$650
	1.4 Project management before title I	(10 % of 1.1 through 1.3)	$450	$450	$450
	1.5 Contingency	(25 % of 1.1 through 1.4)	$1,238	$1,238	$1,238
	Subtotal 1.0		$6,188	$6,188	$6,188
2.0	**Demonstration costs**				
	2.1 Manpower costs during demonstration		$2,400	$2,400	$2,400
	2.2 Design cost	(30 % of 2.5)	$167	$554	$554
	2.3 Inspection cost	(7 % of 2.5)	$39	$129	$129
	2.4 Project management	(10 % of 2.5)	$56	$185	$185
	2.5 Construction cost				
	2.5.1 Building structure costs		$80	$180	$180
	2.5.2 Equipment costs		$350	$1,250	$1,250
	2.5.3 Indirect	(29 % of 2.5.1 & 2.5.2)	$125	$415	$415
	Subtotal of 2.5		$555	$1,845	$1,845
	2.6 Construction management costs	(17.1 % of 2.5)	$95	$315	$315
	2.7 Management Reserve	(10 % of 2.5)	$56	$185	$185
	2.8 Contingency	(25 % of 2.1 through 2.7)	$842	$1,403	$1,403
	Subtotal 2.0		$4,210	$7,016	$7,016
3.0	**Production facility construction costs**				
	3.1 Design cost	(18 % of 3.4)	$4,378	$5,296	$6,627
	3.2 Inspection cost	(7 % of 3.4)	$1,703	$2,059	$2,577
	3.3 Project management	(10 % of 3.4)	$2,432	$2,942	$3,682
	3.4 Construction cost				
	3.4.1 Building structure costs		$3,205	$3,947	$5,778
	3.4.2 Equipment costs		$15,650	$18,859	$22,764
	3.4.3 Indirect	(29 % of 3.4.1 & 3.4.2)	$5,468	$6,614	$8,277
	Subtotal of 3.4		$24,323	$29,420	$36,819
	3.5 Construction management	(17.1 % of 3.4)	$4,159	$5,031	$6,296
	3.6 Management Reserve	(10 % of 3.4)	$2,432	$2,942	$3,682
	3.7 Contingency	(25 % of 3.1 through 3.5)	$9,249	$11,187	$14,000
	Subtotal 3.0		$48,676	$58,877	$73,683
4.0	**Operations Budget Funded Activities (See Sect. 7)**				
	4.1 Conceptual design	(1.5 % of 3.0)	$730	$883	$1,105
	4.2 Safety assurance	(1 % of 3.0)	$487	$589	$737
	4.3 NEPA permiting ($ 6 Mill for EIS, $1 Mill for EA)		$6,000	$6,000	$6,000
	4.4 Preparation for operations	(100 % of 5.0)	$11,623	$16,338	$22,956
	4.5 Project Management	(10 % of 4.1 through 4.4)	$1,884	$2,381	$3,080
	Subtotal 4.0		$20,724	$26,191	$33,878
	Total Initial Cost (1.0,2.0,3.0 & 4.0)		$79,798	$98,272	$120,765
5.0	**Operating and maintainence costs**				
	5.1 Annual operating costs		$5,740	$8,540	$12,600
	5.2 Annual utility costs		$226	$575	$836
	5.3 Annual material costs		$130	$84	$271
	5.4 Annual maintainence costs		$3,202	$3,871	$4,658
	5.5 Contingency	(25 % of 5.1 through 5.4)	$2,325	$3,268	$4,591
	Subtotal 5.0		$11,623	$16,338	$22,956
	Total 20 year O & M cost (20 times Subtotal 4.0)		$232,460	$326,760	$459,120
6.0	**Decontamination & Decommissioning**		$4,143	$5,271	$7,426
7.0	**ROM Life cycle costs (20 years operation)**		$316,401	$430,303	$587,311